REMARKS

All of the examined claims 2-4 and 26-35 remain pending, with amendments, and new claims 36-40 are being added.

Claim Rejections over Prior Art

Claims 2-4, 28, 29, 31, 32, and 34 stand rejected under 35 U.S.C. §102(b) as being anticipated by U.S. Publication no. 2002/0099904A1 to Conley (hereinafter "Conley"). Claims 26, 27, 30, 33, and 35 have been rejected under 35 U.S.C. §103(a) as being unpatentable over Conley in view of U.S. Publication no. 2002/0034105A1 to of Kulkarni et al. (hereinafter "Kulkarni").

In light of the Examiner providing an expanded explanation in the Office Action of his views of how Conley anticipates the claims, which is appreciated, independent claims 2 and 28 are being amended and new claims 36-40 are being added, taking those views into account. Claim 31 and its dependent claims 32-35, however, are not being amended since it is believed, for the reasons given below, that they already contain limitations that render them patentable over Conley as being interpreted in the Office Action.

Conley describes in its cited paragraph 0062 that it is first determined, when receiving a write command, whether the number of pages of data to be written is more than the storage capacity of a full memory cell block. (Step 53 of Figure 14.) If so, the data are written to one or more fully erased blocks. (Step 55 of Figure 14.) But if a fewer number of pages than the capacity of a block are to be written, Conley describes (paragraph 0063) that a previously written partially filled block is sought that has enough capacity remaining that can store the number of pages of data to be written. (Step 61 of Figure 14.) If so, such a block is addressed and the pages of data are stored in its remaining pages. (Steps 63 and 67 of Figure 14.) If not, a fully erased block is used to store the data. (Steps 65 and 67 of Figure 14.) Conley selects a block for storage of a certain amount of data based on matching that amount of data with the available erased storage capacity of the individual blocks.

The present application is directed to improvements in executing write commands having a relatively small amount of data less than some proportion or fraction of the capacity of a block.

Such data are written to a particular block designated for or dedicated to receiving such small amounts of data. By confining writes of such small amounts of data to a single block, there is less data consolidation (garbage collection) required during further operation of the memory system, and therefore also less time consuming copying of valid data that are being consolidated.

Claims 2-4, 26 and 27

Independent claim 2 now more clearly recites that small amounts of data from successive host write commands are written into a common designated block. The small amounts of data are defined to be amounts with sequential logical addresses that are less than a pre-set proportion of the storage capacity of a block. Even if it is argued that Conley has a pre-set proportion of the capacity of a partially written block available for storage of additional data, that proportion will vary from partially written block to partially written block. Conley does not suggest writing quantities of data less than the defined pre-set proportion from a plurality of successive host commands into a designated block. The concern in Conley is to match the amount of data to be written with the erased storage capacity of the blocks. The rejection of claim 2 as being anticipated by Conley is therefore respectfully submitted to have been overcome by more precisely wording the claim.

Dependent claim 3 further defines the method to involve determining for the successive host commands whether they individually carry an amount of data with sequential logical addresses that are less than the pre-set proportion of the storage capacity of a block. Even if it is argued that Conley has a pre-set proportion of the capacity of a partially written block available for storage of additional data, Conley does not suggest determining whether successive commands contain a number of units of data with a number of sequential logical addresses that is less that the stated threshold. The rejection of claim 3 as anticipated by Conley is therefore also respectfully submitted to have been overcome by it's amendment herein.

Dependent claims 26 and 27 stand rejected as obvious over Conley and Kulkarni. Conley of course does not direct data of successive write commands to a designated block based on a pre-set number. Even if it is argued that Conley has a pre-set proportion of the capacity of a partially written block available for storage of additional data, that number depends on the remaining capacity of blocks that contain varying amounts of other data, and is not pre-set for a data accompanying a succession of write commands. Kulkarni is cited for the 25-75 percent

range recited in claims 26 and 27. However, it is not seen how Conley could use any fixed threshold data amount to make decisions on how to direct data writes, since this clearly depends on the storage capacity of available blocks which will vary. The adoption of Kulkarni's percentage limit in Conley appears to have been non-obvious for that reason.

Kulkarni describes, in the cited paragraphs 0013 and 0014, the accumulation of data until at least fifty percent of the capacity of a flash memory block is temporarily stored, at which time that amount of data are written into the flash memory. The percentage threshold of Kulkarni is used to decide *when* to write data into the memory, not to direct *where* the data are to be written, as is the case with claims 26 and 27. It is therefore respectfully submitted that any obvious combination of Conley and Kulkarni would result in Conley accumulating data in system RAM until at least fifty percent of the capacity of a block is stored, after which these stored data would be written to a flash memory block. This is of course not what is claimed herein. It is not seen how Kulkarni could have possibly suggested modifying Conley to direct successive host writes to a specific block based on the amount of data being written therein.

The Office Action (page 11, lines 7-16) contends that differences between what Kulkarni teaches and what is claimed is immaterial. This is respectfully submitted to be incorrect. What is pointed out is that Kulkarni's percentage is used for a completely different purpose than the pre-set proportion being claimed, and therefore it is not seen how Kulkarni could have suggested modifying Conley to use its percentage for the completely different purpose being claimed. Dependent claims 26 and 27 are therefore respectfully submitted to be patentable because of the percentage range specified in them, in addition to the reasons set forth above for their respective parent claims 2 and 3.

Claims 28-30

As amended, independent claim 28 calls for dedicating one of the blocks in which the designated relatively small amounts of data are stored from a plurality of host commands. Similar to the discussion of claim 1 above, Conley does not direct data of a plurality of host writes to a particular block in response to the number of units of data with sequential logical addresses being determined to be less that a pre-set fraction. Reference is made to the discussion of claim 1 above in order to avoid duplication herein. And Conley does not dedicate a block to

receive a plurality of such small data writes, as claimed herein. Claims 28 and 29, rejected as anticipated by Conley, are therefore respectfully submitted to be patentable for these reasons.

Dependent claim 30 adds the same range for the amount of data that is accepted in the dedicated block as does claims 26 and 27 for their parent claims. It is therefore respectfully submitted that claim 30, in addition to being patentable for the same reasons as independent claim 28, is non-obvious over Conley and Kulkarni, for the same reasons as given above for claims 26 and 27.

Claims 31-35

Independent claim 31 recites that first and second blocks are allocated to store relatively small and large number of units of data, respectively, in response to write commands. As part of determining which block data units of a current write command should be directed, two determinations are made:

(1) Whether the number of units of data with sequential logical addresses is less than or more than the fraction of the storage capacity of a block; and

(2) In response to determination (1) resulting in the data being directed to one of the first or second allocated blocks, it is then also determined whether there is enough storage capacity in the selected block for the number of data units of the write command.

The units of data are then written into one of the first or second allocated blocks after both of these determinations are made. Conley describes no such combination, even as being broadly interpreted by the Office Action.

Conley looks to the available capacity of blocks to determine whether a block is available with enough erased space to hold the amount of data of a given write command. Claim 31 defines this *plus* something not disclosed by Conley, namely determining whether the number of units of data are above or below the specified threshold that is set with respect to two allocated blocks. The making of these two distinct determinations are positive limitations of claim 31. It is submitted, even under the view of Conley assumed in the Office Action, that Conley's check of the available erased storage capacity of blocks does not satisfy both of these limitations. Further, Conley does not suggest allocating first and second blocks for storage of a number of units of data in one or the other of these blocks depending whether the amount of data is above

or below the specified threshold. Claim 31 and its dependent claims 32-35 are therefore respectfully submitted to be patentable over Conley for at least the foregoing reasons.

The Office Action (p. 5, line 17 – p. 6, line 2) alleges that the limitations of claim 31 in the paragraph beginning "in response to receipt of a command to write data having a number of sequential logical addresses less than said fraction" are anticipated by steps 61 and 67 of Conley's Figure 14 flowchart. However, steps 61 and 67 determine whether there is a block with enough capacity for the amount of data to be written. A similar determination of whether the first allocated block has enough room for the write is one of the limitations of this paragraph. But nothing is said about the second positive limitation of that paragraph that checks the amount of the data against the fraction of the block storage capacity. Claim 31 includes both determinations.

That same fraction is specified in the next paragraph of claim 31, beginning "in response to receipt of a command to write data having a number of sequential logical addresses equal to or in excess of said fraction." Conley does not suggest allocating first and second blocks for respectively storing amounts of data below or above the fraction threshold. The Office Action (p. 6, lines 3-8) alleges that steps 55 and 57 of Conley's Figure 14 flowchart anticipate this paragraph. But those steps are for writing data in a new unused erased block. It is not seen how this can be taken to suggest storing data in the second allocated block when the number of units is above the specified fraction. This is the same fraction that is a qualifier for the storage of a lesser amount of data in the first allocated block. It is respectfully submitted that the disclosure of Conley cannot be viewed under any theory to anticipate claim 31.

Claims 32-35 are therefore also submitted to be patentable for the same reasons as their parent claim 31. Claims 33 and 35, rejected as obvious over Conley and Kulkarni, specify a range of the fraction of a block's storage capacity that is recited in claim 31. These claims are submitted to provide additional patentability over these references for the same reasons as given above for dependent claims 26 and 27

New Claims

New claims 36-40 have been drafted to include the same novel features described above but in different scope. Independent claim 36 specifies writing data from multiple write

commands into a designated first block when the amount of data is less than a pre-set fraction of the storage capacity of a block. This is believed to be novel over Conley for the same reasons discussed above with regard to claim 2. Conley does not suggest multiple writes to one of the memory cell blocks with an amount of data that is less than a pre-set fraction. Conley instead describes writing data into blocks with enough available erased capacity. That capacity cannot be considered to be the claimed pre-set fraction since it remains only until other data are written into the block, after which the available capacity of the block becomes less. Conley does not suggest comparing the amount of data received with multiple write commands with the same pre-set fraction.

Further, claim 36 also calls for making two determinations (a) and (b) for individual ones of multiple write commands, one to determine whether the amount of data of the write command is less than the pre-set fraction and the other whether the designated block has sufficient erased capacity to store that amount of data. As discussed above with respect to claim 31, Conley does look to the erased storage capacity of blocks when deciding where to write an amount of data but does not in addition compare that amount with a pre-set fraction. Both of the determinations (a) and (b) are part of the claimed method. Conley does something like (b) in a different context but does nothing like (a).

Dependent claim 38 additionally specifies designating a second block for storing amounts of data with a write commands in excess of the pre-set fraction. As mentioned above with respect to claim 31, the use of first and second designated blocks to store, in one case, an amount of data below a pre-set fraction and, in another case, an amount of data above the pre-set fraction, is novel over Conley. Claim 38 additionally very specifically recites the handling of write commands with an amount of data greater than the pre-set fraction, additional novelty over Conley.

Dependent claims 37 and 39 recite the same range for the pre-set fraction as included in claims 26 and 27, so are submitted for the same reasons to have additional novelty over Conley that is not rendered obvious by Kulkarni.
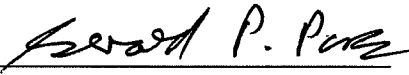
Added independent claim 40 includes the same novel features as discussed above with respect to new claims 36 and 38 but is expressed differently and has a somewhat different scope.

Conclusion

Accordingly, it is believed that this application is now in condition for allowance and an early indication of its allowance is solicited. However, if the Examiner has any further matters that need to be resolved, a telephone call to the undersigned attorney at 415-276-6534 would be appreciated.

Respectfully submitted,

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